

REMARKS

Claims 1-63 are pending in the above-captioned patent application after this amendment. The drawings have been objected to as failing to show every feature of the invention specified in the claims. The specification has been objected to as containing an informality. Claims 1-63 have been rejected.

The Applicants respectfully disagree with the objection to the drawings and the rejection of claims 1-63. However, the Applicants have added a drawing, namely Figure 1A, and amended the specification for the purpose of expediting the patent application process in a manner consistent with the goals of the Patent Office (65 Fed. Reg. 54603).

Support for new Figure 1A can be throughout the originally filed specification, including original Figure 1, the specification at page 9, lines 10-28, and original claims 22 and 47. Support for the amendments to the specification can be found throughout the originally filed specification, including Figure 1, page 9, lines 10-28, and page 12, lines 7-9. No new matter is believed to have been added by this amendment.

Reconsideration of the application is respectfully requested in view of the above-recited amendments and the arguments set forth below.

Examiner's Interview

On April 2, 2002, the undersigned attorney for the applicants conducted a telephone interview with the Examiner Peter Kim to discuss the pending Office Action. Prior to the interview, a draft response was forwarded to the Examiner. During the interview, the prior art and the pending claims were discussed. The Examiner provided that he would have to review the claims and the specification in greater detail prior to making a final determination regarding the claims.

Objection To The Drawings

The drawings are objected to under 37 CFR 1.83(a). In particular, the Patent Office states that the drawings must show every feature of the invention specified in the claims. Specifically, the drawings must show the base isolation system and the optical isolation system at approximately the same height along the Z-axis as specified in claims 22 and 47. In response to the objections of the Patent Office, the Applicants have submitted new Figure 1A that illustrates the base isolation system and the optical isolation system at exactly the same height. Accordingly, the objection to the drawings is believed to be overcome.

Objection To The Specification

The disclosure is objected to because of an informality. In particular, the Patent Office objects to a section of the specification on page 9, line 19. In view of this objection, the Applicants have amended the specification at page 9, line 19 to replace the phrase "base isolation system 42" with the phrase "base isolation system 40". Accordingly, the objection to the specification is believed to be overcome.

Additionally, the Applicants have amended the specification to include a description of new Figure 1A. Moreover, the Applicants have amended the specification in view of the 35 U.S.C. 112 rejection of claims 1-63.

Rejection Under 35 U.S.C. § 112, Second Paragraph

Claims 1-63 have been rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Patent Office states that regarding claims 1, 23, 45 and 57, the structural relationship between the base assembly

and the optical assembly is unclear. In view of this rejection, the Applicants have amended the specification to provide that the optical assembly can be designed without the first stage base and the fine stage. Support for this amendment can be found on page 12, lines 7-9. Accordingly, Applicants respectfully submit that the basis for rejection under 35 U.S.C. 112, second paragraph with respect to claims 1, 23, 45 and 57 has been overcome. The remaining rejected claims 2-22, 24-44, 46-56 and 58-63 depend either directly or indirectly from claims 1, 23, 45 and 57, respectively, and are therefore also considered to be patentable.

Accordingly, the Applicants respectfully assert that all bases for rejecting claims 1-63 under 35 U.S.C. § 112 have been overcome.

Rejections Under 35 U.S.C. § 102

Claims 1-15, 17, 19-37, 39 and 41-63 are rejected under 35 U.S.C. section 102(a) as being anticipated by U.S. Patent No. 5,953,105 issued to Van Engelen et al. ("Van Engelen et al."). Additionally, claims 1-15, 17, 19-37, 39 and 41-63 are rejected under 35 U.S.C. section 102(a) as being anticipated by U.S. Patent No. 6,008,885 issued to Takahashi et al. ("Takahashi et al."). Further, claims 1-15, 17, 19-37, 39 and 41-63 are rejected under 35 U.S.C. section 102(b) as being anticipated by U.S. Patent No. 5,610,686 issued to Osanai ("Osanai"). Still further, claims 1-15, 17, 19-37, 39 and 41-63 are rejected under 35 U.S.C. section 102(e) as being anticipated by U.S. Patent No. 6,252,234 issued to Hazelton et al. ("Hazelton et al."). The Applicants respectfully traverse the rejections of claims 1-15, 17, 19-37, 39 and 41-63, and submit that claims 1-15, 17, 19-37, 39 and 41-63 are patentable over Van Engelen et al., Takahashi et al., Osanai, and Hazelton et al..

The Patent Office provides that Van Engelen et al. discloses an "exposure apparatus comprising a base (269), a base isolation system (273) that secures the base assembly to the mounting base, an optical assembly (265), and an optical isolation system (267) that secures the optical assembly to the base assembly." The Applicants respectfully submit that this is not correct. More specifically, Van Engelen et al. discloses a lithographic device including "a machine frame 263 and a reference frame 265 which is dynamically isolated from the machine frame 263 by means of dynamic isolators 267...(t)he machine frame 263 comprises a basic frame 269 and a force frame 271 which is dynamically isolated from the basic frame 269 by means of dynamic isolators 273." (Van Engelen et al. column 18, line 66 through column 19, line 8). In Van Engelen et al., the reference frame 265 is secured to the machine frame 263 through dynamic isolators 267. Additionally, the basic frame 269 is secured to the force frame 271 through dynamic isolators 273.

As a result thereof, Van Engelen et al. does not teach or disclose an optical isolation system that secures the optical assembly to the base assembly.

The Patent Office provides that Takahashi et al. discloses an "exposure apparatus comprising a base (7), a base isolation system (8) that secures the base assembly to the mounting base, an optical assembly (9), and an optical isolation system (11) that secures the optical assembly to the base assembly." The Applicants respectfully submit that this is not correct. More specifically, Takahashi et al. discloses an exposure apparatus where "(t)he X-Y stage 3 is mounted on a stage base 7 which is supported by the floor, for example, at three points and through three dampers 8. The first supporting means 101 and the projection optical system 2 are mounted on a barrel base 9 which is supported by the base frame 10 through three dampers 11 and pillars 12." (Takahashi et al. column 3,

lines 8-13). In Takahashi et al., the stage base 7 is secured to the floor through three dampers 8. Additionally, the barrel base 9 is secured to the base frame 10 through three dampers 11.

As a result thereof, Takahashi et al. does not teach or disclose an optical isolation system that secures the optical assembly to the base assembly.

The Patent Office provides that Osanai discloses an "exposure apparatus comprising a base (8), a base isolation system (13) that secures the base assembly to the mounting base, an optical assembly (4), and an optical isolation system (11) that secures the optical assembly to the base assembly." The Applicants respectfully submit that this is not correct. More specifically, Osanai discloses an exposure apparatus including a stage base 8 mounted on a main base 9 where the main base 9 and the barrel support 4 are coupled to each other. Osanai further discloses that "(d)enoted at 11 are air mounts disposed at four locations, for supporting the main base 9. Denoted at 12 is a base for supporting the whole structure of the apparatus through the air mounts 11. The air mounts 11 serve to isolate the main base 9 from vibration of the base 12. Denoted at 13 are air cushions which are provided at three locations on the stage base 8, for supporting the stage base..." (Osanai column 4, lines 34-51). In Osanai, the stage base 8 is mounted on the main base 9. Further, the stage base 8 is secured to the base 12 through air cushions 13. Additionally, the barrel support 4 and the main base 9 are secured to the base 12 through air mounts 11.

As a result thereof, Osanai does not teach or disclose an optical isolation system that secures the optical assembly to the base assembly. Additionally, the main base 9 supports the stage base 8, thereby inhibiting any "isolation" between the optical assembly and the base assembly.

The Patent Office provides that Hazelton et al. discloses an "exposure apparatus comprising a base (40), a base isolation system (60) that secures the base assembly to the mounting base, an optical assembly (42), and an optical isolation system (60) that secures the optical assembly to the base assembly." The Applicants respectfully submit that this is not correct. More specifically, Hazelton et al. discloses an exposure system where "the illumination system 14, the reticle stage 18 and the projection optics 24 are separately supported by frames 38, 40 and 42 respectively. The frames are coupled to the "ground" (or the surface on which the overall exposure system is supported). As will be noted below, the frames 38, 40 and 42 may be coupled to the ground by means of vibration isolation systems and the like." (Hazelton et al. column 3, lines 47-53). The vibration isolation systems are described further as damping means 60. (Hazelton et al. column 4, lines 26-30). In Hazelton et al., the frame 40 is secured to the ground or other surface through damping means 60. Additionally, the frame 42 is secured to the ground or other surface through damping means 60.

As a result thereof, Hazelton et al. does not disclose an optical isolation system that secures the optical assembly to the base assembly.

Claims 1-15, 17 and 19-22

In distinction to Van Engelen et al., Takahashi et al., Osanai, and Hazelton et al., claim 1 recites "An exposure apparatus ... comprising: a base assembly that includes at least a portion of the stage assembly; a base isolation system that secures the base assembly to the mounting base, the base isolation system reducing the effect of vibration of the mounting base causing vibration on the base assembly; an optical assembly that includes an optical device that directs the beam of light and a stage base of the stage

assembly; and an optical isolation system that secures the optical assembly to the base assembly, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device.” Because the cited references do not teach or suggest these features, including an optical isolation system that secures the optical assembly to the base assembly, claim 1 is patentable. Further, because claims 2-15, 17 and 19-22 depend either directly or indirectly from claim 1, these claims are also patentable.

Claims 23-37, 39 and 41-44

In distinction to Van Engelen et al., Takahashi et al., Osanai, and Hazelton et al., claim 23 recites “A method for making an exposure apparatus ... comprising the steps of: providing a base assembly that includes at least a portion of the stage assembly; providing a base isolation system; securing the base assembly to the mounting base with the base isolation system, the base isolation system reducing the effect of vibration of the mounting base causing vibration on the base assembly; providing an optical assembly that includes an optical device that directs the beam of light and a stage base of the stage assembly; providing an optical isolation system; and securing the optical assembly to the base assembly with the optical isolation system, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device.” Because the cited references do not teach or suggest these features, including securing the optical assembly to the base assembly with the optical isolation system, claim 23 is patentable. Further, because claims 24-37, 39 and 41-44 depend either directly or indirectly from claim 23, these claims are also patentable.

Claims 45-56

In distinction to Van Engelen et al., Takahashi et al., Osanai, and Hazelton et al., claim 45 recites "An exposure apparatus ... comprising: a base assembly that includes at least a portion of the stage assembly; an optical assembly that includes an optical frame, an optical device and a stage base, the optical device directs the beam of light and the stage base supports a portion of the stage assembly, the optical frame including a center frame, and a first upper base mount that supports the stage base; and an optical isolation system that secures the optical assembly to the base assembly, the optical isolation system including a first support that is secured to the center frame, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device; wherein the first support and a proximal section of the first upper base mount are substantially aligned along a first Z axis." Because the cited references do not teach or suggest these features, including an optical isolation system that secures the optical assembly to the base assembly, claim 45 is patentable. Further, because claims 46-56 depend either directly or indirectly from claim 45, these claims are also patentable.

Claims 57-63

In distinction to Van Engelen et al., Takahashi et al., Osanai, and Hazelton et al., claim 57 recites "An exposure apparatus ... comprising: a base assembly that includes at least a portion of the stage assembly; an optical assembly that includes an optical frame, an optical device and a sensor column, the optical device directs the beam of light, the optical frame including a center frame, the sensor column including a first sensor mount that secures the sensor column to the optical frame; and an optical isolation system that

secures the optical assembly to the base assembly, the optical isolation system including a first support that is secured to the center frame, the optical isolation system reducing the effect of vibration of the base assembly causing vibration on at least one of the optical assembly and the optical device; wherein the first support and the first sensor mount are substantially aligned along a first Z axis." Because the cited references do not teach or suggest these features, including an optical isolation system that secures the optical assembly to the base assembly, claim 57 is patentable. Further, because claims 58-63 depend either directly or indirectly from claim 57, these claims are also patentable.

Rejections Under 35 U.S.C. § 103(a)

Claims 16, 18, 38 and 40 are rejected under 35 U.S.C. section 103(a) as being unpatentable over Van Engelen et al. in view of Hayashi, U.S. Patent No. 6,036,162 ("Hayashi"). Additionally, claims 16, 18, 38 and 40 are rejected under 35 U.S.C. section 103(a) as being unpatentable over Takahashi et al. in view of Hayashi. Further, claims 16, 18, 38 and 40 are rejected under 35 U.S.C. section 103(a) as being unpatentable over Osanai in view of Hayashi. Still further, claims 16, 18, 38 and 40 are rejected under 35 U.S.C. section 103(a) as being unpatentable over Hazelton et al. in view of Hayashi. The Applicants respectfully traverse the rejection of claims 16, 18, 38 and 40 and submit that claims 16, 18, 38 and 40 are patentable in view of the cited combinations of references.

As provided above, claims 1 and 23 are patentable. Because claims 16 and 18 depend indirectly from claim 1, these claims are also considered to be patentable. Further, because claims 38 and 40 depend indirectly from claim 23, these claims are also considered to be patentable.

Version with markings to show changes made:

In the Specification:

The specification has been amended as follows:

The paragraph beginning on page 9, line 10 has been replaced:

The central body frame 78 also defines a base frame aperture 106 that is sized and shaped to receive a portion of the optical assembly 36 and the optical frame 20. The central body frame 78 also includes three assembly support mounts 108 that are positioned, spaced apart, along the perimeter of the base frame aperture 106. It should be noted that the assembly support mounts 108 are at approximately the same height along the Z axis as the base support mounts 100, 102, 104. As a result of this design, the base isolation system 40 and the optical isolation system 42 are at approximately the same height along the Z axis and approximately the same plane. As provided herein, the center of the base isolation system [42] 40 is preferably between approximately zero inches and twelve inches of the center of the optical isolation system 42 along the Z axis. Further, as a result of this design, the optical assembly 36 is "nested," i.e. positioned within the base assembly 38 and the optical device 22 can be accessed relatively easily for service and adjustment. Moreover, this minimizes the distance between the assembly support mounts 108 and the base support mounts 100, 102, 104. As a result thereof, distortion and vibration of the central body frame 78 are minimized. As illustrated in Figure 11, the assembly support mounts 108 can be removably secured to the central body frame 78 to facilitate assembly of the exposure apparatus 10 (not illustrated in Figure 11).

The paragraph beginning on page 17, line 1 has been replaced:

The optical assembly 36 can include [includes] (i) the optical frame 20, (ii) the optical device 22, (iii) a sensor column 180, (iv) a portion of the measurement system 24, (v) the first stage base 130, and (vi) the fine stage 132. As a result of the design provided herein, the optical assembly 36 can be easily removed from the exposure apparatus 10. For example, the optical assembly 36 allows the optical device 22 and the optical frame 20

to be removed from the exposure apparatus 10 as a module. Alternately, for example, the optical assembly 36 can be designed without the first stage base 130 and the fine stage 132.

The paragraph beginning on page 19, line 3 has been replaced:

As shown in the Figures, the optical frame 20 supports the first stage base 130 and the fine stage 132. More specifically, the first stage base 130 is secured to the spaced apart upper stage mounts 192. With this design, the optical assembly 36 can be removed from the exposure apparatus 10 after removing the first stage base 130, the fine stage 132, and the rest of the first stage assembly 16. This simplifies the assembly and the disassembly of the exposure apparatus 10. Alternately, in another embodiment, the exposure apparatus can be designed so the optical frame 20 does not support the first stage base 130 and the fine stage 132.

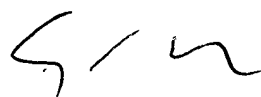
A brief description of Figure 1A has been added before the brief description of Figure 2 on page 5, line 3, and a paragraph has been added before the paragraph on page 9, line 29.

CONCLUSION

In conclusion, Applicants respectfully assert that claims 1-63 are patentable for the reasons set forth above, and that the application is now in a condition for allowance. Accordingly, an early notice of allowance is respectfully requested. The Examiner is requested to call the undersigned at 858-456-1951 for any reason that would advance the instant application to issue.

Dated this 2nd day of April, 2002.

Respectfully submitted,



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